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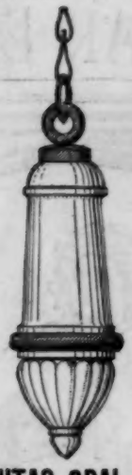
OPAL PULL.



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THE bridge-builders of the country recently held a national Convention, at which one of the subjects of discussion was the monopoly of the manufacture of iron rolled beams and channels now enjoyed here by a combination of nine or ten rolling-mills, the managers of which keep the price of their product at what seems to the bridge-builders an unreasonably high point. It seems, however, to have been easier to point out the objections to the monopoly than to find a remedy for it, and the convention adjourned, after passing some resolutions looking to the establishment of a new rolling-mill, to be operated by the bridge-builders for their own benefit. As the bridge-builders use a great deal of rolled iron, it might be worth while for them to make so large an investment as the establishment of a rolling-mill would involve, but we are rather surprised that none of the members of the Convention should have thought of proposing the engagement of a shop in Belgium in the interest of the American bridge-builders. Under Judge Gray's recent decision, it seems as if the construction which he put upon the tariff in regard to a framed floor would apply equally well to a bridge or roof, and that a bridge made and fitted in Belgium, out of beams, plates and channels costing a cent a pound or less, then taken apart and shipped here, would, even after paying an *ad valorem* duty of forty-five per cent, as a "manufacture" of iron, be far cheaper than the same thing constructed here of beams and channels at the combination price of nearly three cents a pound, and probably quite as cheap as if it were made out of iron rolled in the bridge-builders' own mill here; while a contract with a foreign shop to do, after the American manner, such work as might be confided to it, would involve no risk, and no investment of capital in an enterprise of very doubtful prudence.

A GOOD deal of criticism has been directed against the present Egyptian Government on account of its decision to abandon the famous Boulak Museum, in the suburbs of Cairo, and remove the collection which it contains, perhaps the most mysterious and interesting in the world, to what is described as a tumble-down old country-house in a desolate region on the other side of the Nile, near the Pyramids. To judge from the accounts which have appeared here, this decision was made by the Egyptian Government out of pure wantonness and disregard of the decencies of archæology and science, and we are glad to find, from a letter in *La Semaine des Constructeurs*, that the case is by no means so bad as it has been represented. It is true that the Boulak Museum is to be abandoned, but it is for the reason that the collection is now too large to be properly accommodated in the building, and is every day being increased through the interest which the Government takes in it. When it became evident that the present quarters would no longer suffice for the valuable objects which ought to be shown, the Minister of Public Works applied to the executive authority for permission to appropriate a neighboring estate, belonging to Djehlal Pacha, for the purpose of enlarging the Museum buildings, but, after a long discussion in the State Council, it was decided that the situation of Boulak did not in any case offer the convenience and isolation desirable for a great museum, and it would be better, instead of investing more money there, to sacrifice what had already been spent, and remove the collection to a place where it could be permanently and conveniently accommodated, with facilities for indefinite future enlargement. The villa of Ismail Pacha, although rather remote at present, offered the room and isolation necessary, and it was decided to transfer the collection to it. The Boulak Museum was the creation of Mariette Bey, who, on his death in 1881, was, by order of the Government, buried in the garden of the Museum, and a beautiful and stately monument erected over his grave. This monument, with the remains of the man whom it commemorates, is to be transported to the new location and set up in the same position relative to the buildings, so that no one can say that the Egyptian Government has shown any wanton carelessness of its precious collection or of the one to whom it owes most of it; and, as the Gizeh shore is soon to be connected with Cairo by a bridge, it may not be many years before the palace, which is now in the desert, will be the centre of a handsome suburb, and the foresight of the present ministry in securing so advantageous a location for the museum will be universally commended.

SOME of the people who write to the French architectural journals think that it is time for the architects to use their influence to have some of their number elected to the House of Deputies, on the ground that the lawyers and doctors are represented there, while the architects, who have quite as much experience in affairs as they, are neglected. There is certainly a good deal of sense in this. The President of France is a civil engineer, and a very good one, as well as the most sensible and judicious public man in the country, and one or two architects have gained high reputation and influence in the English Parliament; but it is curious to find that the French technical papers discourage the idea of connecting the profession with public life, on the ground that politics is a matter which interests only the more worthless and degraded citizens, and that an architect would cast very little credit on himself and his profession by having anything to do with it.

THE American Colony in Paris has presented to the city of Paris a reduced copy of Bartholdi's great Liberty statue, as a mark of gratitude and friendship, and the affair was inaugurated with considerable ceremony on the fourteenth of July. The place chosen for the statue is a curious, but very effective and appropriate one — the lower side of the bridge of Grenelle, in the middle of the Seine. It was, of course, hardly possible to obstruct the bridge itself with the monument, so a foundation was laid in the bed of the river beside one of the piers of the bridge, and a semicircular mass of stonework carried up, about fifty-five feet high, on which rests the pedestal of the statue. The pedestal is of white Jura limestone, rising about twenty-three feet above the roadway of the bridge, and decorated only with inscriptions and a few mouldings. The principal inscription is the one proposed by Vice-President Morton: "True friends are a better defence for a State than armies.

EVERY one has heard of the Prince of Monaco, who reigns with great dignity, when he is at home, over a community of seven thousand souls, but much prefers to sail about in his yacht, devoting himself to scientific investigations, which he carries on with an ardor and success which will probably make him the most famous of all his distinguished family. Among the peaceful exploits of the Prince, none are more conspicuous than his successful investigations into the natural history of the bottom of the sea, which have resulted in bringing to light, from regions where it was supposed that no life could exist, creatures of the most extraordinary character, huge, phosphorescent fishes, which illuminate the dark water

through which they swim, crustaceans and mollusks of new and unheard-of shapes. By a happy idea, the Pavilion of the Principality of Monaco at the Paris Exposition is in great part devoted to the display of the interesting apparatus used in his researches by the Prince, whose people seem pleased to identify themselves with his work, and thus share in the distinction which he has won. In the investigations of the Prince, which have extended from the banks of Newfoundland to the coast of Africa, one of the most important objects was originally the determination of the flow of ocean-currents in the North Atlantic, and many hundred floats have been sent out and thermometric observations at different depths taken, to ascertain, for instance, the movement of the Gulf Stream. Incidentally, it became necessary to make soundings at great depths, and an apparatus was invented by which not only the ocean was sounded with perfect accuracy in the deepest places, but thermometric observations of temperature were made at a depth of two miles from the surface. To make these observations, nothing was needed, in principle, but a long wire carrying a self-registering thermometer and a very heavy weight, several tons in some cases, secured in such a way as to detach itself on arriving at the bottom, and a delicate dynamometer, over which the wire ran, and which showed, by the sudden diminution of the strain, when the weight reached the ground; but when the attempt was made to bring living creatures from such depths, great difficulties were encountered, and overcome by most ingenious means. The cage in which the submarine animals were caught, according to *Le Génie Civil*, consisted in a cylinder of wire having three conical entrances, like those of a lobster-pot, and weighted, like the sounding wire, with detachable weights. It was, however, very unlikely that at these immense depths, where the darkness is practically total, any fishes would voluntarily find their way into the trap, and steps were taken to attract them by a light placed inside it. Obviously, no light was available but an electric light, but to get an electric light to burn a mile or two under water was not easy. To send the current from above was impracticable, as the friction of the thick, insulated wire would cause it to break before the trap could be drawn up, and the only resource was to supply the incandescent wire from a battery in the trap. Here, however, another difficulty appeared. The battery, which must be of considerable power, needed to be enclosed in a box of some kind, to keep it from being affected by the salt water, and as the hydrostatic pressure at such depths was six or seven hundred pounds to the square inch, it was found impossible to make a suitable box which was not crushed before it reached its destination. At last, however, this trouble was overcome by the curious device of connecting the box with a balloon. The balloon was made of cloth dipped in India-rubber, and so arranged that the air in it was in communication with that in the battery box. On sinking the apparatus, the hydrostatic pressure, being virtually uniform all around the balloon, compressed it equally on all sides, forcing the air out of it into the battery box, until the pressure inside the box and balloon exactly balanced the pressure outside. This process went on to any extent, so that at the bottom of the sea, although the balloon was reduced by the enormous force exerted on it to a small fraction of its original size, it still kept the internal and external pressures equal. On raising the apparatus again, it expanded as the pressure diminished, and brought the battery box to the surface uninjured. So successful was this device, that, not content with capturing deep-sea fishes with it, the Prince and his assistants propose on their next expedition to send down a photographic apparatus, and bring back negatives of the bottom of the ocean, as seen by the electric light.

A NEW cement, for securing iron into stone, is described in some of the foreign papers. The cement is made by melting rosin, and stirring in brick-dust, which must be finely ground and sifted, until a sort of putty is formed, which, however, runs easily while hot. In using, the iron is set into the hole in the stone prepared to receive it, and the melted putty poured in, until the space is filled; then, if desired, bits of brick, previously warmed, may be pushed into the mass, and a little of the cement thereby saved. As soon as the whole is cool, the iron will be firmly held to the stone, and the cement is quite durable, and uninjured by the weather, while, unlike lead and sulphur, it has no injurious effect on the iron.

EVERY one who reads of the Manchester Ship-Canal, which is to make the manufacturers of Manchester independent of the railways and of Liverpool dock-charges, by enabling steamships from New Orleans and Savannah to unload their cotton bales directly into the precincts of the mills, may not realize that the construction of the canal itself is a greater work than the Panama Canal, involving the removal of a larger volume of material than the whole amount to be excavated for the Panama Canal, including the famous cutting through the hill of Culebra, and requiring about as many locks, of about the same dimensions. Yet the Manchester Canal is under contract to be finished complete for about twenty-five million dollars, while the works at Panama, if they are ever carried through, will cost ten or twelve times as much, this enormous difference being chargeable in great part to the construction of the Gamboa dam, which will be necessary to keep the Chagres River from washing away the Panama Canal every year, and which has no counterpart at Manchester, while the rest is to be accounted for by the great cost of labor at Panama, the expense of the necessary financiering, the large salaries paid to attract the numerous corps of engineers and officials required to risk their lives in the climate of the Isthmus, and the outlay needed for terminal accommodations, hospitals and so on, and for the purchase of the Panama Railway.

THE *Builder* says that a floating theatre is to be constructed in St. Petersburg, consisting of a steamboat, on the American plan, with two decks, in which will be arranged a theatre, with seats for a thousand persons, besides accommodations for the actors, musicians and so on. The affair is intended to make trips on the long Russian rivers, giving performances at the large towns on the way. This would not be a bad idea for this country, which has plenty of long rivers, on whose banks are many towns capable of furnishing a paying audience for a theatre of a thousand seats, and the expenses of the company, both for transportation and maintenance, would be light compared with those incident to travelling by rail and living at hotels.

WE commend the following story, from the *Sanitary News*, to the attention of psychologists. It is reported, the story says, that a young man in Oxford, England, "possesses the hypnotic gift to a wonderful degree," and employs it in a manner which does credit to his business talent. When he has occasion to make a small purchase, he goes into a store, seeks out what he wants, then hypnotizes the salesman, apparently by looking at him, and lays down a penny. To the hypnotized salesman the penny appears to be a sovereign, and he hands the difference between the value of his purchase and a pound sterling to the accomplished young man, who walks off, considerably richer by the transaction. The principal witness of these singular performances seems to have been a policeman, who followed the youth for two weeks, in which his trick failed but once, and arrested him just as he had paid for a theatre ticket with a dirty piece of brown paper, and had received change for a five-pound note. It would be interesting to know how the warrant read on which the arrest was made. There is certainly no statute against hypnotism in England, unless the witchcraft laws of the time of Elizabeth cover the case; and if a shop-keeper, on merely being looked in the eye, chooses to give a man twenty-five dollars in exchange for a piece of brown paper, we do not see how the man can legally be prevented from taking it.

ALL architects, foreigners as well as Frenchmen, are invited to present designs in competition for the annual prize of the Société Académique d'Architecture de Lyon. The subject of the competition this year is an "Athénée Lyonnaise," or what we should perhaps call a lyceum. The building is to stand on a lot containing four thousand square metres, or about forty thousand square feet, surrounded on all sides by streets, and is to comprise a concert-hall, with rooms attached which can be rented for exhibitions, fairs, entertainments, and so on. The drawings must be received at Lyons before December 4, and the author of the best design will be rewarded with a gold medal and forty dollars in money. The second prize is a silver medal. The same society offers similar prizes for the best drawings of antique monuments or fragments of art from the region about Lyons, intending by this means to help to preserve from oblivion the beauties of objects which are now falling to decay, and will soon disappear.

SAFE BUILDING.[1]—XXXIII.

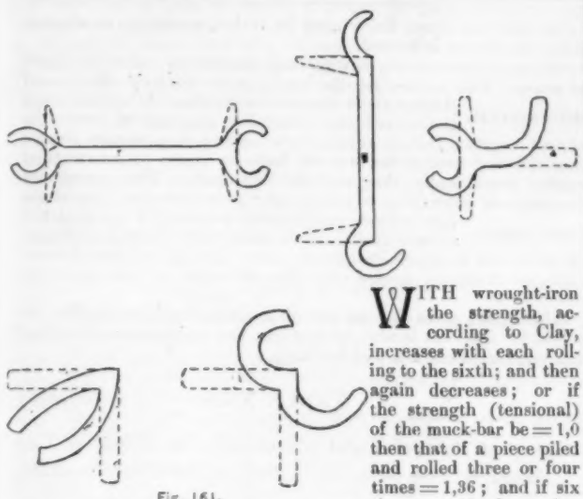


Fig. 161.

WITH wrought-iron the strength, according to Clay, increases with each rolling to the sixth; and then again decreases; or if the strength (tensional) of the muck-bar be = 1,0 then that of a piece piled and rolled three or four times = 1,36; and if six times = 1,41; decreasing again to = 1,0 at the twelfth re-working. This, however, as already stated is shown to be very doubtful with American irons, and largely dependent on the nature of the muck-bar. Kirkaldy has shown that welding does not make as strong a joint as the original iron. He made some eighteen experiments on welded bars of wrought-iron from $1\frac{1}{4}''$ to $\frac{3}{4}''$ diameter, the result being that none were equal to the original strength. The maximum strength attained was 97,4 per cent; the minimum 56,2 per cent and the average was 80,62 per cent of the original strength. Welded joints should, therefore, be taken at only about four-fifths of the strength of iron in calculating for tension or transverse strains. It is usual, however, to call for sufficient extra metal in all welded joints, so that the pieces must invariably break elsewhere than at the joint, when tested.

Effect of Re-rolling Wrought-iron.

In wrought-iron the skin seems to add some strength to the metal and for this reason, partly also on account of the more intricate interlacing of fibres in bar-iron, which is worked on all sides, bar-iron is generally stronger than plate-iron; plate-iron being about 84 per cent of bar-iron. The plate-iron itself is always stronger with the grain than across it, resembling wood in this quality. Experiments have shown the tensile strength to be nearly 10 per cent greater along the grain, than across it. Shearing would show even greater difference, being some 25 per cent easier with the grain than across it.

Bar-iron Strongest.

Wrought-iron should always be heated before hammering or working.

Its tensile stress is greatly reduced by cold hammering; experiments (according to Box) showing the reduction to be

a loss of 32 per cent if 2″ thick
a loss of 36 per cent if $1\frac{1}{2}''$ thick
a loss of 13 per cent if 1″ thick

or an average loss of 27 per cent by cold hammering.

Effect of Cold Rolling.

By annealing the iron the strength can be partially restored but not entirely, the loss in the above experiment still being after the annealing

some 14 per cent in the 2″ thick iron
some 4 per cent in the $1\frac{1}{2}''$ thick iron
some 8,6 per cent in the 1″ thick iron

or an average loss of about 9 per cent.

Unwin, however, claims the exact opposite. According to tests quoted by him, wrought-iron and mild steel increase in tensional strength and have a greater elastic limit, if worked cold, but suffer a large loss in ductility. The working however must be uniform on all parts and not local otherwise the material is weakened by uneven resistance. Annealing, according to Unwin, removes the effects of cold rolling or cold working and should be used where this is only local or on certain parts, as in the case of punching of rivet holes, where the part around the hole is hardened by cold hammering and the rest left unhardened. He cites the process of wire-drawing, which is similar to cold rolling and certainly adds greatly to the tensional strength of the material.

Avoid Blue-heat.

He finds one very curious fact, however, and that is that while neither cold nor hot working hurts wrought-iron or mild steel, working them at an intermediate or "blue-heat," that is at about 470° to 600° F., is positively harmful. In many tests it was found that samples of either, about $\frac{3}{4}$ inches thick, could be bent back and forth on an average some twenty times, without breaking, if they were either cold or red hot. But if heated to an intermediate blue-heat they all broke readily after being bent back and forth only two or three times. Annealing ordinary wrought-iron means a loss of from 5 per cent to 10 per cent in tensile strength. The strength is not affected, however, by low temperatures nor ordinary variations in temperature, nor very much at higher temperatures. At high temperatures up to from 600° to 900° F. the tensile strength of wrought-iron increases somewhat. Beyond this it decreases rapidly. Pure wrought-iron will increase up to a higher temperature than impure iron. Neither cast-iron nor steel are affected much by low temperature nor the ordinary variations in same.

[1] Continued from page 64, No. 711

Steel varies with carbon in strength.

With steel the tensional, transverse and compressive stresses vary greatly with the composition of the material. As already stated the more carbon it contains, the less elastic, but the harder is the steel, while the less carbon it contains, the more elastic, but less hard will it be. The ultimate limits for tension per square inch are given in Table IV from 42000 pounds to 108000 pounds and for compression from 90000 pounds to 150000 pounds, all per square inch.

Steel like wrought-iron is stronger in bars than in plates (plate-steel being about 80 per cent of bar-steel), and is stronger with the grain than across it. The proportions for tension and shearing across or along the grain being about the same in steel, as in the wrought-iron. In regard to re-working, according to Mr. Clay, the strength of steel is increased to the fourth piling, and then declines, until at the seventh re-working it is weaker than after the first working. Or, if the tensional strength of the first working is = 1,0 the fourth is = 1,253 and the seventh = 0,94. This, however, is quite as dubious as the advantage of re-working wrought-iron very often. Welded joints in steel are very much weaker than the original metal, having only some 40 per cent to 55 per cent of the strength of the unwelded parts.

If steel plates are worked cold they lose strength greatly. (Unwin, however, denies this for mild steel if working is uniform). Punching them cold decreases their tensional strength some 33 per cent, if very hard steel; the milder the steel the less will the loss be. But this loss can be restored again by annealing after punching. Annealing instead of damaging steel plates greatly increases their tensional strength, particularly if the steel is very hard, adding some 50 per cent to same. But is of slight, if any, advantage in mild steel. But after all said, the only sure method for the architect to pursue is to make careful tests to see whether the material possesses the necessary qualities and strengths he desires. Chemical tests should therefore give way to practical tests.

Do not punch steel cold.

The tensional or compressive ultimate strength can be readily ascertained by testing small pieces in testing-machines, and making proper allowances for the differences in sizes of test-pieces and full-size members. These machines are of various sorts, but generally by hydraulic power or weights, greatly increased by leverage or screw-action, they tear small specimens apart, or else crush them, the effects on the pieces being carefully noted and recorded. Some of the machines make automatic records. The kind of machine used is not so essential to the architect so long as he has ascertained its reliability. From the tensional and compressive ultimate strength the cross-breaking strength of the specimen can be calculated; or the modulus of rupture can be obtained by breaking specimens across with centre loads and calculating the modulus of rupture by the following Formula:

Tests for strength.

Modulus of rupture from tests.

$$k = \frac{3}{2}\cdot\frac{w.l}{b.d^2} \qquad (102)$$

Where k = the ultimate modulus of rupture of a material, per square inch.

Where w = the load or amount of pressure, in pounds, applied at the centre, required to break a specimen of rectangular cross-section, lying on two supports.

Where l = the clear length, in inches, between supports.

Where b = the width of specimen, in inches, measured (across the specimen) at right angles to the line of pressure.

Where d = the depth of specimen, in inches, measured along the line of pressure.

Where the test specimen is exactly square in cross-section and of one square inch area, that is one inch by one inch, and where the supports are exactly twelve inches apart, and the load or pressure applied in the centre, the modulus of rupture will always be eighteen times the load or pressure, or:

$$k = 18.w \qquad (103)$$

Where k = the ultimate modulus of rupture of a material, per square inch.

Where w = the load of pressure, in pounds, applied at the centre, required to break a test specimen, of one inch by one inch (square) cross-section, lying on supports exactly twelve inches apart. The shearing strength is generally found by direct tests.

Shear off test specimens.

Test specimens of steel, wrought or cast iron, should never be broken off suddenly, or by blows; nor should they be jarred, as otherwise the fibres crystallize more or less and this greatly affects the result. They should be carefully planed off in the machine-shop.

Another important point is to be sure to have all test specimens, when not sheared off the actual pieces being used, of the same material and general thickness as the pieces.

In cast-iron, frequently, test-pieces are cast on to each piece, these are broken off and tested. They should not be broken off, however,

except in the presence of the architect or his inspector. If they are of the same thickness as the piece, they offer a fair test; if, however, they are much smaller and thinner than the piece no reliance can be placed on the result.

In wrought-iron and steel it is best to roll the pieces a little too long and shear off the superfluous ends for testing.

Other Tests. Besides the tests as to strength there are many tests resorted to, to ascertain approximately the quality of the material. A few will be given here. If cast-iron be struck on its edge a sharp blow with a chisel or hammer, it is of soft and good quality if it can be indented. If it breaks it is very hard and brittle. If it rings out clearly, it is a good casting; if the sound is dull it is full of sand-holes, air-bubbles or flaws.

If the surface is smooth, even and hard, and the edges sharp and perfect it is a good casting. If the edges or surfaces are uneven and wavy it is an indication of unequal shrinkage and cooling or more likely unskilful ramming of the sand in the flask around the pattern or mould. If hollow pieces, when tapped, show uneven thicknesses on opposite sides the core has sagged or floated in the mould.[1]

In iron and steel the principal tests resorted to are for tensional strength, elasticity, ductility and limit of elasticity. These will be explained presently. The nature of the material can also be more or less ascertained by fracture and bending. It is almost impossible, however, to distinguish mild steel from wrought-iron excepting by tests for strength, and to ascertain whether or no they can be hardened or tempered, as already explained. If specimens of iron or steel on fracture show a close, silky, fibrous grain, with few bright or crystaline specks the metal is good. If there are many crystals in the fracture, and particularly if they are coarse and large, and there are great "blotches" of color, or other evident impurities, the metal is poor. The color of the fibres is grey, that of crystals of a bright silvery aspect. It must be always remembered, however, to get the fracture by shearing, or by slow bending, when cold, otherwise crystals will be formed while testing.

Condition of Fracture.

Bending Tests. Specimens are frequently nicked and then bent cold until fractured, in such cases there will usually be a large percentage of crystals close to the nicked part, but none in the other half. All iron should be required to be free from all visible seams, blisters, buckles, cinder spots or imperfect edges.

If iron or steel pieces on fracture show the seams where the different layers have been piled and rolled together, that is, if the seams open perceptibly and are very marked, the metal is badly rolled or united. If these seams can be distinctly seen by the naked eye before fracture, the quality is even poorer. If iron or steel for a few hours be immersed in or wetted with some strong acid, such as either nitric, muriatic or sulphuric acid, the parts between the fibres will be eaten away, and the latter will be distinctly exposed. The architect can then readily judge of the nature of the rolling or working, whether the layers (or piles) are thoroughly worked together, and whether the fibres are close and all thoroughly interlaced.

Acid Tests.

Good wrought-iron should be capable of being bent double, without fracture, *while cold*, over a cylinder of diameter equal to twice the thickness of the piece. The iron should not crack under this test. If nicked, and then bent double suddenly by a blow from a sledge hammer the fracture should show but a small proportion of crystals and these nearer the nicked edge.

Beams, channels, angles and tees should be capable of having their flanges or legs bent, that is rolled up longitudinally and away from the web or other leg without opening the inside joint between web and flanges, or between legs. In practice, however, the iron usually furnished by the mills will not stand so severe a test. Its quality will be in proportion to its ability to stand this severe test.

Figure 161 shows a few illustrations of such bending tests, the dotted lines showing outlines of original sections, before bending.

Tests for mild steel should be the same as for wrought-iron.

Ductility and Elasticity. Ductility and elasticity are the same practically as stretching. If the material has high ductility its cross-section will be diminished greatly, when stretched, before breaking. If it has great elasticity it will stretch greatly, that is, become much longer before breaking.

Wrought-iron should be allowed a stretch $=\frac{1}{2\frac{1}{2}}$ of an inch for each foot of length of specimen if subjected to a tensional strain of 10000 pounds, per square inch. Every important tensional piece should be tested up to 10000 pounds, per square inch. Those elongating more should be condemned. On removing the strain the piece should recover its original length exactly.

Safe strains in testing. Test pieces should be strained up to 18000 pounds, per square inch, for compression and should then recover their original thickness, they should not crush completely under 36000 pounds, per square inch. Compression test-pieces must, of course, be short blocks or cubes. They should stand at least 25000 pounds, per square inch, in tension without losing their capacity for recovering their original length, and should not tear apart under less than 50000 pounds tension, per square inch for small sections; if sections or plates are large they should stand at least 46000 pounds tension.

[1] A skilful moulder will arrange vent-holes and spaces so in the mould as to avoid dirt and blow-holes, no matter what the shape of the piece.

For steel the above limits must be varied, according to whether mild or hard steel is desired.

All metals, theoretically change their dimensions under the slightest strain. That is, they become longer under tensional strains, and shorter under compressive strains. When the strain is removed the material is supposed to recover its original length. This, however, is true only up to a certain strain; when this is exceeded the material loses its power to recover and remains permanently elongated or shortened. This permanent elongation or shortening is called the "*permanent set*," the strain (per square inch) which produces it is called the "*elastic limit*." This elastic limit varies in different materials, but is approximately at about *one-half* of the ultimate strain, or strain per square inch that will crush or tear apart the material.

Permanent Set.

Elastic Limit.

Table XXX gives the amount of extension and contraction, in inches, for different strains, of cast-iron and wrought-iron pieces, if each piece were one hundred feet long.

TABLE XXX.

Amount of Extension and Contraction, in inches, of Cast and Wrought Iron Bars, 100 ft. long, under different strains.

Strain, per square inch, in pounds.	CAST IRON.		WROUGHT IRON.
	Extension, under tension.	Contraction, under compression.	Extension, under tension or contraction, under compression.
1000	0,08308	0,09155	0,0444
2000	0,17150	0,18404	0,0889
3000	0,26528	0,27747	0,1333
4000	0,36442	0,37185	0,1778
5000	0,46890	0,46715	0,2222
6000	0,57874	0,56341	0,2667
7000	0,69392	0,66061	0,3111
8000	0,81446	0,75875	0,3556
9000	0,94036	0,85782	0,4000
10000	1,07160	0,95784	0,4444
11000	1,20820	1,05880	0,4889
12000	1,35014	1,16070	0,5333
13000	1,49744	1,26354	0,5778
14000	1,65010	1,36733	0,6222
15000	1,80810	1,47205	0,6667
16000	.....	1,57871	0,7111
17000	.....	1,68432	0,7556
18000	.....	1,79186	0,8000
19000	.....	1,90035	0,8444
20000	.....	2,00978	0,8889
21000	.....	2,11994	0,9333
22000	.....	2,23145	0,9778
23000	.....	2,34370	1,0222
24000	.....	2,45690	1,0667
25000	.....	2,57102	1,1111

In very hard materials it is more than half the strain, for such materials not being elastic, will stretch (or shorten) but very little and will not show appreciable variation until a high strain is reached, when they show a set quickly, and break soon after. In soft, elastic, ductile materials they begin showing permanent stretching (or shortening) very early and continue to do so for a long time before breaking. The following will be quite safe to follow as general guides.

For cast-iron the elastic limit is about $\frac{1}{4}$ of the ultimate tensional or compressive stress.

For wrought-iron the elastic limit is about $\frac{1}{2}$ of the ultimate tensional or compressive stress in bars, and about $\frac{2}{3}$ in plates.

For mild steel the elastic limit is about $\frac{9}{10}$ and from this it varies to about $\frac{1}{2}$ for

Hard steel — both, of course, of either the ultimate tensional or compressive stress.

Up to the elastic limit it is supposed that the amount of stretch (or shortening) is exactly proportional to the amount of strain, and that the material will recover its exact original length. Reference is here made to Formula (88). Neither of the above suppositions are exactly true, though in wrought-iron and mild-steels it is very nearly so. Cast-iron, however, is very variable in its extensions or contractions under strains; and all three show more or less "fatigue" and permanent set, under variable, or oft-repeated (on-and-off), or prolonged strains.

Box treats this subject very fully.

Extension of Cast-iron. He finds the extension of cast-iron, subjected to tensional strains, to be:

$$e = \frac{L}{10000000} \cdot (8{,}04.w + 0{,}0002676.w^2) \qquad (104)$$

Where e = the total amount of extension, in inches, of a piece of cast-iron, subjected to tensional strains.

Where L = the original length, in feet, of the piece of cast-iron.

Where w = the tensional strain, in pounds, per square inch, of cross-section of the cast-iron piece.

Table XXXI gives the length of piece required to stretch or contract exactly one inch under different strains.

TABLE XXXI.

Length of Cast or Wrought Iron Bars, in feet, that will stretch o contract exactly one inch under different strains.

Strain, in pounds, per square inch.	CAST IRON.		WROUGHT IRON.
	Length, in feet, to extend one inch.	Length, in feet, to shorten one inch.	Length, in feet, to either extend or shorten one inch.
1000	1204	1094	2250
2000	583	543	1125
3000	377	360	750
4000	274	269	562
5000	213	214	450
6000	173	177	375
7000	144	151	321
8000	123	132	281
9000	106	117	250
10000	93	104	225
11000	83	94	204
12000	74	86	187
13000	67	79	173
14000	61	73	161
15000	55	68	150
16000	....	63	141
17000	....	59	132
18000	....	56	125
19000	....	53	118
20000	....	50	112
21000	....	47	107
22000	....	45	102
23000	....	43	98
24000	....	41	94
25000	....	40	90

It will be readily seen, that the increase in extension is in a higher ratio than the increase in strain, which is due, as already said, to the very defective elasticity of cast-iron.

For compressive strains in cast-iron, Box's researches give the following Formula:

Contraction of Cast-iron.

$$c = \frac{L}{10000000} \cdot (9{,}108.w + 0{,}000047044.w^2) \qquad (105)$$

Where c = the total amount of shortening, in inches, of a piece of cast-iron, subjected to compression strains.

Where L = the original length, in feet, of the piece of cast-iron.

Where w = the compression strain, in pounds, per square inch, of cross-section of the cast-iron piece.

Of course, in either case the extension or contraction from changes of temperature will be independent of the above.

By comparing these formulæ it will be seen that cast-iron yields more readily, that is, shortens more in proportion under very small compressive strains, than it extends under small tensional strains. But as the strains become greater the amount of shortening and extension become more nearly equal; they are exactly equal for strains of 4842 pounds per square inch, while for greater strains the amount of extension from tensional strains is greater than the amount of compression from the same compressive strain. With wrought-iron and mild-steel the compression under small strains is even in a much more marked ratio than under small tensional strains owing to the "flowing" of the metal under compressive strains. There are no reliable experiments recorded, however, on which any formulæ could be based for wrought-iron, it may be safely assumed, however, to be perfectly elastic up to 18000 pounds, (per square inch), compressive strain and 25000 pounds, (per square inch), tensional strain. With heavier strains the shortening or lengthening will be in very much quicker ratio than the increase in their respective strains. With steel it will depend upon its nature. Mild steel will approximate nearly to the perfect elasticity of wrought-iron, under safe strains, while hard steels will become more imperfect in elasticity the nearer they approximate the nature of cast-iron.

Time plays a very important part in considering the final effect on metals of any strain.

Time Tests. It has been found that a moderate strain on a bar, if left on a long time, will gradually increase its effect, either extending it more and more as time passes on, or shortening it more and more. This is known as the "fatigue" of the metal.

If the strain is within the elastic limit the increase in "set" will continue for a long time, but will finally become so infinitesimally small, as to be practically nothing. If, however, the strain is beyond the limit of elasticity the set will continue to grow and the piece will frequently break after many years under a strain which was considered well within the original ultimate breaking strength, but which, as time passed, fatigued, that is tired out, the material. Severe strains should therefore never be borne for a lengthened period, but should only be imposed for short periods, and they should be well within the elastic limit, to give the metal a chance to recover from the set produced by such strains.

Intermittent Strains. Oft-repeated strains, even where put on entirely without shock, greatly weaken a material. It has been found that a load, which originally was borne with perfect safety, will, if often removed and replaced, finally break the piece.

Planat concludes by comparing many experiments on fatigue of iron: that if a strain of 58700 pounds, per square inch, can be repeated 170000 times before breaking a test piece, the same piece will break under a strain of only 48000 pounds, per square inch, if repeated 480000 times; or under a strain of 42700 pounds, per square inch, if repeated 1320000 times; or under a strain of 38400 pounds, per square inch, if repeated 4035000 times; while a strain of 32000 pounds can be repeated forever and would never break the piece.

These experiments were made by A. Wöhler and confirmed by Spangenberg, Baker, Baushinger and others: they are usually carried out by means of revolving wheels or by pistons which alternately put on and remove the strain, the number of revolutions or pressures being carefully computed. Piston-rods of engines offer good examples of oft-repeated off-and-on loads, or the driving-rods of locomotives, in fact many parts of machinery.

Impact or Rolling loads. Where a load is put on suddenly, with shock, that is falls on, or is forced on, suddenly without regard to whether it jars or not, the effect is practically double that of a stationary (static) or dead load. This is called "impact." The subject is too extensive to enter into here, the actual effect on the beam depending upon the length of span, height of fall, and permanent load; but it will be safe enough in all such cases to simply double the factor-of-safety, or in other words allow only one-half of the safe-stress, that would be allowed for an intermittent load put on without shock. Rolling loads are considered the same as loads put on with shock; the effect depending, of course, on the velocity; all such loads, moving, rolling, jarring, etc., are called dynamic as opposed to static or dead loads.

Reversed Intermittent Strains. If the strain is reversed at each application, that is alternately tension and then compression, the effect is equal to the sum of both, that is, double that of the same amount of strain if not reversed. To break anything we instinctively bend it one way and then the other, by doing this we reverse the strains in the fibres from compression to tension and vice-versa at each bend, the result being that the piece soon breaks.

Box has combined these rules in a Table, which is here given as Table XXXII.

By combining this table with the safe stresses given in Tables IV and V, that is taking whatever part of the safe-stress there given for dead loads, that the nature of the load demands, we can obtain the safe-stress under any manner of loading. Where stresses in opposite directions take place, the material will yield in the direction of the weakest stress.

TABLE XXXII.

ULTIMATE BREAKING STRENGTH OF MATERIALS UNDER DIFFERENT KINDS OF STRAINS.

Material.	If Dead Load (Static).	Intermittent Loads (off-and-on continuously.)			
		If in one direction only.		If in opposite directions.	
		Without shock.	Rolling (dynamic).	Without shock.	Rolling (dynamic).
Wrought Iron and Steel.	1	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{6}$
Wrought Copper and Brass, also Slate, Timber, Masonry, etc.	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{8}$
Cast metals: Iron, Copper, Brass, Lead, etc.	1	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{12}$

How to use Table XXXII. Thus, if we have a bar of American cast-iron, according to Table IV it will be safe under a steady (static) compressive strain of 15000 pounds, per square inch, or a steady tensional strain of 2500 pounds, per square inch.

If the compressive strain were constantly and entirely removed and then put on again, but without shock, it would be safe, according to Table XXXII, to use but $\frac{1}{3}$ of this amount of 5000 pounds, per square inch; while under the same circumstances only 833 pounds would be safe in tension. If the strain were constantly removed and then put on again with shock, that is suddenly, or kept moving, only one-sixth would be safe or 2500 pounds per square inch, in compression, and 417 pounds in tension.

If the strain were alternately compression and then tension, but put on without shock the same strains would be safe; the safe strength of the bar would, therefore, be measured by the weaker of the two and would be only 417 pounds, per square inch. If the strains alternated between compression and tension and besides this were dynamic (put on suddenly) only one twelfth would be safe or 1250 pounds in compression and 209 pounds in tension, both per square inch. The strength of the bar under these circumstances would, therefore, be only 209 pounds, per square inch.

For wrought-iron we have the same safe-stress, whether in tension or compression; for a dead, constant load we should use then, from Table IV, 12000 pounds, per square inch; from Table XXXII we should have for intermittent loads, in one direction only, that is of the same nature, but put on-and-off continuously, but without shock, two-thirds or 8000 pounds, per square inch. If put on-and-off suddenly 4000 pounds, per square inch. The same if constantly reversed from compression to tension but done slowly and without shock. If constantly reversed and it is done suddenly or with shock the safe strain per square inch would be only 2000 pounds.

[To be continued.]

THE ILLUSTRATIONS.

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

HOUSE ON EAST FIFTY-THIRD STREET, NEW YORK, N. Y.

[Gelatine Print, issued only with the Imperial Edition.]

INTERIOR OF BAMBERG CATHEDRAL, BAVARIA.

This plate is copied from "*Le Moyen Age Monumentale et Archeologique*," in connection with the article on "Equestrian Monuments," elsewhere in this issue.

DESIGN FOR THE MONUMENT TO THE CONSTITUTIONAL ASSEMBLY. J. P. AUBÉ, SCULPTOR.

See article on "Aubé," elsewhere in this issue.

STATUE OF SHAKESPEARE. — STATUE OF MICHEL LALLIER. J. P. AUBÉ, SCULPTOR.

See article on "Aubé," elsewhere in this issue.

HOUSE OF J. E. WARE, ESQ., ANNISTON, ALA. MESSRS. CHISHOLM & GREEN, ARCHITECTS, ANNISTON, ALA.

The cost of this house was about $7,000.

THE HAMMOND BUILDING, DETROIT, MICH. MR. GEORGE H. EDBROOKE, ARCHITECT, NEW YORK, N. Y.

AN INTERIOR. MESSRS. BRIGHAM & SPOFFORD, ARCHITECTS, BOSTON, MASS.

EQUESTRIAN MONUMENTS.[1] — XIX.

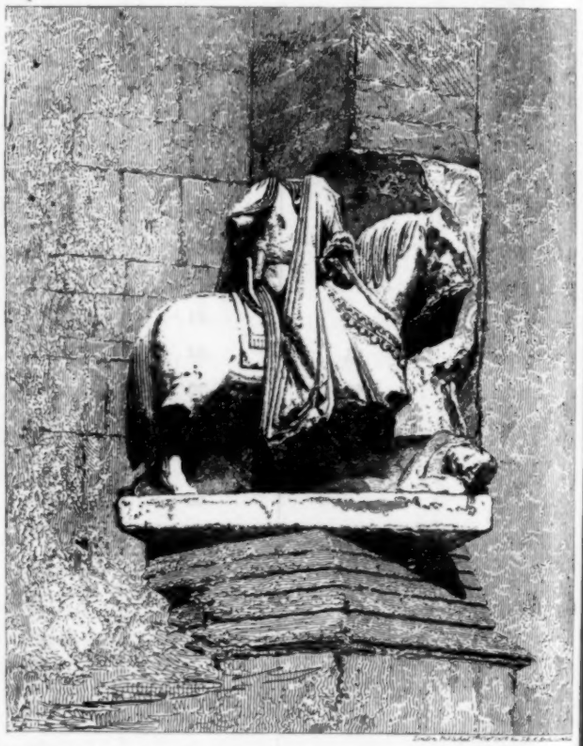
THE CRUSADERS.

Trajan and the Widow. From the Ducal Palace, Venice.

It has been most natural in following up this subject of equestrian sculpture in fairly chronological sequence to pass over temporarily an historical epoch of very great interest for the sake of discussing some of the works of the Renaissance period which represented personages of the times. Thus it is that the statues of the *condottieri* have been described, while those earlier and still more interesting warriors, the Crusaders, have been for the moment neglected.

Thanks to the genius of Sir Walter Scott and other romancers the crusader is an heroic entity to every one in his youth, and it is not always that one finds time to correct the conception formed at an impressionable age by a closer study of history in riper years. So long as Scott is read, it will be useless for historians to attempt to prove that Richard Cœur de Lion was little more than a brutal bully; the belief that he was a chivalrous knight of noble personal character is too deeply instilled: and, in like way, we all are ready to believe that the personages whom we now find commemorated, here and there, by recumbent sculptured effigies with legs crossed at the ankle, the leg or the knee — according as the defunct crusader had taken part in one or more crusades — were most noble and praiseworthy individuals during their lifetime. And so, doubtless, they were, for times have changed and it is hardly fair to apply the moral code of the nineteenth century to the actions of individuals who lived in the eleventh and twelfth.

It is not necessary to our purpose to even sketch the history of the very complicated events in which our subjects played a part. It



William the Conqueror, St. Etienne, Caen. From Cotman's "*Antiquities of Normandy.*"

would take too much space to describe how widespread religious enthusiasm was awakened; how the early attempts resulted in the wasting and destruction of the undisciplined hordes before even they could set foot beyond the confines of Europe; how later attempts under abler leaders succeeded better; how Jerusalem was actually delivered, then lost and, after many scores of years, again freed for a short time from the polluting control of the infidel; how enthusiasm was fostered and a spirit of unrest fomented by wily popes, who found their temporal power and possessions vastly increased by the simple process of acting as mortgagee — and care was taken that only "grab mortgages" were taken — for the many princes and and leaders who could maintain their forces in the field — forces raised for the glory and extension of the true faith — only by pledging their patrimony to the Church, who Jesuitically rewarded

[1] Continued from page 27, No. 708.

their enthusiastic self-devotion on true cold-blooded business principles.

All Europe was in arms, and armed forces on the road to Palestine often met opposition from armed forces on the road thither, or gave occasion for those who staid at home to pay off old scores, by attacking the possessions of those who had left insufficient forces to guard them while crusading in Holy Land. It was not a time when the arts of peace could flourish, and it is small wonder that of contemporary sculpture there is so little.

There now exist quite a number of equestrian monuments erected to the honor of some crusader, but they are mostly the idealizations of sculptors of a later day, and so do not have the interest that attaches to the contemporary portrait statues of the *condottieri*. The only exception to this statement is found at Bamberg, where, in the cathedral, supported upon brackets against a pier of the nave, stands an equestrian statue of Conrad III, Emperor of Germany [1093–1152], which is understood to be the work of a contemporary sculptor — it is known to have been in existence, at least, as early as 1250, and hence is one of the earliest equestrian portrait statues, after the Roman period, now in existence.

Before the Crusades Jerusalem was the object of many pilgrimages, and it was largely the inconvenience and indignities to which pilgrims were subjected that brought about the crusading movement. Like many another, Conrad when a young man made a pilgrimage to Jerusalem, after it had been wrested from the Saracens in the first crusade, and having thus had personal experience of the reality of the evil, it was most natural that when the time came he, too, should turn crusader, and unite with Louis VII of France in conducting the second crusade, the first in which European monarchs were personally interested. Conrad was defeated by the Sultan Massoud, at Iconium, in 1147, and returned to Germany the following year without having accomplished anything.

William I, Falaise. L. Rochet, Sculptor.

It is curious to note that in the Church of St. Etienne, at Caen, occupying a position very similar to that held by the statue of Conrad, save that it is placed on an external wall, there stands the broken equestrian group which is generally accepted as a statue of William of Normandy, later conqueror of England. It originally was built into the wall beside the gate of St. Etienne, and it was probably while there that it suffered mutilation. Before, however, the sculptor's work was wholly effaced, the group was transferred to the south wall of the great church, and there set in place. The group, which is sometimes called Roman work, is generally supposed to represent some historical incident in which a woman pleads with the mounted warrior either to spare the life of the son or husband who lies beneath the horse's feet, or else calls on him to avenge her loss at the hands of some enemy who has slain him. The incident of a woman, supplicating a horseman, is one not infrequently represented in sculpture. Near the same city, in the Abbey of St. Georges, at Bocherville, is a capital where such a scene is depicted, and on one of the capitals of the Ducal Palace, at Venice, is carved a woman, who has stopped the mounted Emperor Trajan to prefer an entreaty of similar character.

The first crusade had, however, resulted in the redemption of Jerusalem and the crowning in 1099, as King of Jerusalem, of Godefroy de Bouillon, on whom had gradually fallen the leadership of the miscellaneous and disjointed forces which religious enthusiasm had brought together, each petty contingent owning allegiance only to its own leader. It is narrated of Godefroy, as evidence of the deeply religious enthusiasm that influenced the early crusaders, that when he was declared King of Jerusalem he declined the crown, on the ground that he could not wear one of gold, since Jesus was content to wear one of thorns. This hypothetical saying would give one a very exalted idea of the moral stature of the man and the character of the times when such a speech could be received with applause and recorded for transmission to posterity on the pages of history. Unfortunately, these same pages bear the record of the fact that this meek and humble-spirited noble was at least a consenting party to one of the most atrocious scenes of carnage that ever took place. Of the taking of Jerusalem, Dean Milman writes: "Children were seized by their legs, some of them plucked from their mother's breasts, and dashed against the walls or whirled from the battlements. Others were obliged to leap from the walls; some tortured, roasted by slow fires. They ripped up prisoners to see if they had swallowed gold. Of 70,000 Saracens, there were not left enough to bury the dead; poor Christians were hired to perform the office. Every one surprised in the Temple was slaughtered, till the reek from the dead bodies drove away the slayers. The Jews were burned alive in their synagogue. Even the day after, all who had taken refuge on the roofs, notwithstanding Tancred's [Tancred of Hauteville] resistance, were hewn to pieces."

Whatever part Godefroy played in this massacre, there is little doubt that, for the times, he was a devout and pure-minded leader, and if his bigotry did get the better of his humanity, under somewhat exciting circumstances, doubtless he repented of his zeal at a later day when his exaltation had somewhat evaporated, and so he was at least as worthy a subject for honoring, in these later years, with an equestrian monument as many another who has been so honored, both before and since. At all events, in the year 1848 was erected in the Place Royal, at Brussels, on the spot assumed to be the place where in 1097 Godefroy preached his crusade, a colossal bronze equestrian statue of the famous crusader, the work of the sculptor, Simonis.

To English readers the typical crusader will always be Richard Cœur de Lion, and it seems strange that so popular a monarch, and so romantic and chivalrous a character should not have inspired more than one English sculptor to do him honor. Only two equestrian statues of the royal Plantagenet exist, the work, too, of semi-domesticated alien sculptors at that, while there are Hanoverian Georges and Williams unnumbered, set astride for all time. Marochetti's statue of Richard I, because of its position between the east end of Westminster Abbey and the Houses of Parliament, is probably one of the best-known statues in the world, and one more easily remembered than the antiques at Rome because of appealing more closely to the common knowledge of the day, and its good qualities, such as they are, are more often appreciated than those of the Colleoni, at Venice, or the Gattamelata at Padua. If the sculptor had been a man of a little more force, he

would have left us a grand statue, but as it is, it smacks a little too strongly of the mere Italian prettiness of the degenerate Italian art of to-day, and both horse and rider suggest rather the graces of the *manége* than the rugged frame of a rough-and-ready crusader and his war-horse. It was proper enough to make the steed rather of an Arab type since the heavy horses of the North, even those which

Godefroy de Bouillon, Brussels. E. Simonis, Sculptor.

survived the sea-passage, soon succumbed to the torrid temperature of Syria, and Richard probably had in his stud horses in which the desert strain was even more marked than in this. Some critics declare the statue a good one, but seen to disadvantage because of the disproportionately low pedestal, which is only some eight feet high: this is a matter of opinion, and one is rather inclined to count as a merit the fact that, in this case, there is no question as to which is the important part of the composition — the pedestal or its surmounting group. The general air of sleekness, lack of force and character in the modelling and over-elaboration in the detailing of armor and parts of the horse prevent this from being a great sculptural success, but it will always be an historically interesting monument to all, and to many not trained in critical observation will appear all that a statue should.

As associated through a similarity of character and achievement with Richard, it may be proper here to speak of another statue of

Richard Coeur de Lion, London. C. Marochetti, Sculptor.

William the Conqueror, although his only connection with the crusades is that when Duke Robert of Normandy went on a pilgrimage to Jerusalem, he appointed his son William, a child of seven years only, to be his successor in the dukedom. If the Conqueror had been of German strain, there would doubtless be in England many monuments erected to his glory; but though there are hosts of Englishmen whose highest boast is that they are descended from some soldier of William's invading force, there has been no one who thought it worth while to commemorate the Norman leader in bronze or marble. Just as the old equestrian monument of William, already mentioned, is in Normandy, so is this second one to be sought in that quarter, where it will be found in

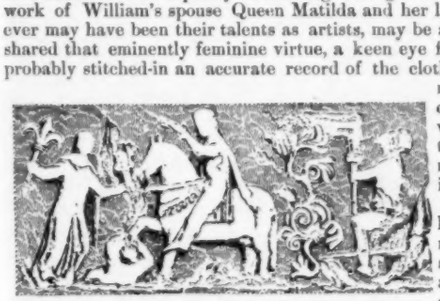
Eaton Hall, Chester. Alfred Waterhouse, R. A., Architect.

the most natural of places, the birthplace of William, bastard son of Robert the Devil and Arlette, daughter of a furrier of that town.

Not unnaturally William was fond of Falaise, where he was born, and when after the conquest of England, leaving the island to be governed or misgoverned by a viceroy, he returned across the Channel, he spent much of his time there, and he and his successors did much to improve and benefit the town, enlarging it, building about it fortifying walls and beautifying it in many ways. So the town has always regarded him rather in the light of a tutelary saint, and finally felt it incumbent on its inhabitants to erect to his memory

Hugh Lupus, Chester. G. F. Watts, R. A., Sculptor.

a statue. This was done, and on October 23, 1851, was uncovered in the Place de la Trinité the work of the sculptor Rochet, which in some ways is a remarkable piece of sculpture — at least it is the one which exhibits more vivacity of action on the part of both horse and rider, than can be found elsewhere. It is supposed to be archæologically correct, at any rate, for the sculptor carefully studied the famous tapestry in the neighboring town of Bayeux, the work of William's spouse Queen Matilda and her ladies who, whatever may have been their talents as artists, may be assumed to have shared that eminently feminine virtue, a keen eye for dress, and so probably stitched-in an accurate record of the clothes and arms, if not the features, of the men whose actions they were committing to undying fame.



Abbey St. Georges, Boscherville. From Cotman's "*Antiquities of Normandy.*"

The total height of the monument is seven metres, and the statue consumed 6,000 kilogrammes of bronze, and is said to have cost about $12,000. The granite pedestal is commonplace, and made more so by the too-small effigies of six of his predecessors plastered against it.

One of William's favorite followers, a nephew, was Hugh d' Avranches, or Hugh Lupus as he is known in English history, whom he rewarded by making Lord of the Welsh Marches, a territory so large as to be, in effect, a principality, and as such Hugh treated it, setting up an independent court, creating barons and holding his own parliament. The history of the Welsh Marches affords many passages of the most turbulent parts of English annals, and Hugh had plenty of fighting to keep down his increase in weight, which finally earned for him the soubriquet of "the Gross;" but besides being a famous fighting-ground the Welsh Marches were, and in some degree still are, famous for their heron, and so they were at one time the most noted hawking-grounds in England, and Hugh when he had no quarrels on hand devoted himself to this sport with ardor. It is this that led Mr. George F. Watts, R. A., who besides being a painter of the first class has proved himself also a sculptor of no mean ability, to choose to commemorate Hugh Lupus the huntsman rather than Hugh d' Avranches the warrior, in the large equestrian group that was not long ago set up before Eaton Hall, the palace at Chester of the Duke of Westminster, a direct lineal descendant of the subject. The statue which is nearly colossal in size seems so successful that any sculptor might be proud of it, much more a man who has spent most of his life in oil-painting. It seems rather odd that Mr. Watts, who is happily in such easy circumstances that he is able to gratify his whim and keep in his own possession the pictures he paints, should seemingly have so far departed from his rule as to have one of his works set up in this semi-public place, for Eaton Hall is a "show place;" but as the Duke of Westminster is the richest man in England, he was perhaps able to offer inducements that no sane man could resist.

THE CRUSADES. — Holy wars in which the warriors wore a cross, and fought, nominally at least, for the honor of the Cross. Each nation had its special color, which, says Matthew Paris, was *red* for France; *white* for England; *green* for Flanders; for Italy it was blue or *azure;* for Spain, *gules;* for Scotland, a St. Andrew's cross; for the Knights Templars, red on white.

The seven Crusades were:

1. (1096–1100.) Preached by Peter the Hermit. Led by Godefroy de Bouillon, who took Jerusalem.
2. (1147–1149.) At the instigation of St. Bernard. Led by Louis VII and the Emperor Conrad. To secure the union of Europe.
3. (1189–1193.) Led by Richard *Lion-heart.* For knightly distinction. This was against Saladin or Salah-riddin.
4. (1202–1204.) Led by Baldwin of Flanders and the Doge. To glorify the Venetians.
5. (1217.) Led by John of Brienne, titular King of Jerusalem. To suit his own purpose.
6. (1228–1229.) Led by Frederick II. To suit the purposes of the Pope.
7. (1248–1254 and 8 (1268–1270.) To satisfy the religious scruples of Louis IX.

CONRAD III. — Of Germany, born in 1093. He was elected emperor in 1138, but his title was disputed by Henry the Proud, Duke of Saxony, and a civil war ensued between the rivals. Conrad was the conqueror, ending the conflict by his victory at Weinsberg in 1140. He conducted a large army of crusaders to the Holy Land in 1147, and besieged Damascus, but failed to take it and returned in 1149. He died in 1152.

GODEFROY DE BOUILLON. — This illustrious leader of the first Crusade was born near Nivelle in France, about 1058. Having gained renown at an early age while fighting for Henry IV, of Germany, he was by him created Duke of Bouillon. The command of the principal army of the crusaders was entrusted to him, and in 1096 he set out for Constantinople. He procured the release of Hugh, Count of Vermandois, a brother of the King of France, who was imprisoned at Constantinople by the Emperor Alexius, and made a treaty with Alexius by which the crusaders agreed to do homage to the emperor on condition of his assistance. The army next advanced to Nice, which was taken after a long siege, and in June, 1098, Antioch surrendered to the crusaders. With the remains of the army, now much reduced by famine and disease, Godefroy marched to Jerusalem, the siege of which was begun in June, 1099, and ended the July following by the capture of the city. He was unanimously chosen King of Jerusalem by the crusaders. He soon afterwards won another victory over the Saracens, at Ascalon. Godefroy gave Jerusalem a set of laws, called the "Assize of Jerusalem," resembling the feudal system of Europe. He did not long survive the taking of the city, as he died in July, 1100. Tasso made him the hero of his "*Jerusalem Delivered,*" and the poet does not appear to have exaggerated the merits of a character which presented an unusual combination of wisdom and heroism with the highest Christian virtues.

SIMONIS. — Eugene Simonis was born at Liège, in 1810, and studied at the Belgian Academy in Bologna, and under Finelli in Rome. He made his debut at the Brussels *Salon*, in 1836, and won a second-class medal at the Paris *Salon* of 1840. He was created an officer of the Order of Leopold and Director of the Academy of Fine Arts, at Brussels, in which city he died in 1882. His works include a number of the sculptures on the column erected at Brussels to commemorate the Congress of June 4, 1831, by which the present Constitution of Belgium was established; the composition entitled "The Harmony of the Passions," which fills the tympanum of the Theatre Royal, at Brussels; the monument to Canon Triest, in Brussels Cathedral; a statue of Leopold I, at Mons: a statue of Pepin d' Héristal; and the following other works: "A warrior defending the standard of his country;" "Charity;" "Innocence" (owned by the State); "A jaguar devouring a rabbit," and numerous sculptures of children and animals.

RICHARD CŒUR DE LION. — Richard I, King of England, surnamed Cœur de Lion, was the son of Henry II and Queen Eleanor. He was born at Oxford, in 1157, and was invested in the duchy of Guienne. He united with his brother Henry in a revolt against his father, in 1173, and on the death of Prince Henry, ten years later, became heir-apparent. In 1188, he made a secret alliance with Philip, King of France, the enemy of Henry II, and openly revolted against his father in 1189. The allies waged war successfully against Henry in France, and induced him to accept their terms of peace. Henry II, however, died in July, 1189, and Richard came to the throne. He showed compunction for his undutiful conduct and chose his father's faithful servants for his ministers. He had agreed a short time before his accession to join the French king in a crusade, and he therefore appointed his mother regent of the kingdom, and departed for Palestine in 1190, the combined French and English armies numbering 100,000 men. Embarking at Marseilles and Genoa, they sailed to Sicily, where the winter was passed, not without serious dissensions arising between the two monarchs, who looked upon each other as rivals. Richard married Berengaria, Princess of Navarre, at Cyprus, in 1191, and in the summer of that year arrived at Acre, which the crusaders had been besieging for two years, and which was still defended by Saladin. Richard and Philip both distinguished themselves by performing many acts of valor at this seige, the former particularly acquiring a splendid reputation for heroism. Acre surrendered in July, 1191, soon after which Philip returned to France, and in September Richard defeated Saladin in a great battle. He then made a truce with him for three years, three months, three weeks and three days, and sailed for home in October, 1192, but was wrecked on the coast of Istria. Attempting to pass through Germany in disguise, he was arrested by Leopold, of Austria, who transferred him to the emperor, Henry VI, an enemy of Richard. By him he was confined in a dungeon, with many insults, and did not regain his freedom until February, 1194, on payment of a heavy ransom. Meantime his brother John had attempted to usurp the royal power, but was successfully resisted. Richard was afterwards involved in several unimportant wars with his rival, Philip of France, but made a truce for five years in 1198. At the siege of the castle of Chalus, near Limoges, in March, 1199, he was mortally wounded by an arrow, and died in the tenth year of his reign and the forty-second of his age.

MAROCHETTI. — Baron Charles Marochetti was born at Turin, in 1805. At an early age his family removed to Paris, where his father practised as an advocate in the Cour de Cassation. After receiving a general education at the Lycee Napoléon, young Marochetti, having shown considerable taste for modelling, entered the studio of Bosio and also studied at L' Ecole des Beaux-Arts. He went to Rome when about seventeen years old and studied there until his twenty-fifth year. At the *Salon* of 1827 he exhibited a group entitled "A Girl playing with a Dog," which gained him a second-class medal. Later he revisited Turin and adorned the city of his birth with an equestrian statue of Emmanuel Philibert, a free gift to the inhabitants. Charles Albert, King of Sardinia, in acknowledgment of his liberality, conferred upon him the title of "Baron," and was ever afterwards a warm friend of the sculptor, who in later years executed an equestrian statue of his benefactor, which is also in Turin. Returning to Paris, Marochetti became a naturalized Frenchman (in 1841), and was well received by Louis Philippe, who gave him many commissions. The Revolution of 1848 drove Marochetti into exile with his royal patron and, like him, he took up his abode in England where he met with much favor from the royal family and the nobility. He first exhibited at the Royal Academy, in 1851, with a bust of the Prince Consort. Ten years later he was elected an Associate and an Academician in 1866. He was made a Chevalier of the Legion of Honor in 1839, and Grand Officer of St. Maurice and Lazarus in 1861. He died at Passy, near Paris, in 1867. Marochetti produced a number of equestrian monuments, among which are one of Wellington, at Glasgow; one each of Queen Victoria and Prince Albert, in the same city; one of the Duke of Orleans; and one of Field

Marshal Combermere, at Chester; and he also executed a design for an equestrian figure of Washington, the cast of which was exhibited at the Crystal Palace, in New York, and destroyed when that edifice was burned in 1858. His other works include statues of Lord Clyde, in Waterloo Place, London; Lord Clive, in Shrewsbury; La Tour d' Auvergne, in Carhaix; monuments to Bellini, in Père-Lachaise; to Lords William and Frederick Melbourne, in St. Paul's; to the British soldiers dead in the Crimea, at Scutari; and the mausoleum of the Princess Elizabeth, daughter of Charles I, in the Church of St. Thomas, Newport, Isle of Wight. In addition, may be mentioned his "Apotheosis of Mary Magdalene," on the high altar of the Madeleine, at Paris; the bas-relief of the battle of Jemappes on the Arc de Triomphe; "The Fallen Angel"; "Sappho," and many busts.

William the Conqueror. — William I, surnamed the Conqueror, born at Falaise, in Normandy, in 1025, was an illegitimate son of Robert, Duke of Normandy. He succeeded his father in 1035, as William II of Normandy, and during his minority gave proof of his energy and courage by reducing to submission the rebellious Norman barons. He gained the favor of his kinsman, Edward the Confessor, King of England, who, having no issue, formed a secret intention to adopt William as his heir. His chief competitor was Harold, a Saxon prince, whom a majority of English people preferred to William. On the death of Edward, in January, 1066, Harold ascended the throne, without opposition, and William resolved to invade England. Assembling a fleet of 3,000 vessels and an army of 60,000 men, he set sail and landed at Pevensey in Sussex, about the 28th of September, and defeated the English, commanded by Harold, at Senlac, near Hastings, on October 14th. Harold was killed in this battle and William is said to have lost nearly 15,000 men. The latter was crowned in Westminster Abbey on the 25th of December, Edgar Atheling, who had been proclaimed King on the death of Harold, renouncing his claim and submitting to William. He ruled England with much severity and maintained his power by acts of great cruelty. He refused to render homage for his kingdom to Pope Gregory VII, but paid him the usual tribute of Peter's pence. About 1078, his son Robert levied war against him in Normandy, but happening to encounter the King and wounding and unhorsing him, was struck with remorse on discovering what he had done, asked his father's pardon and made peace with him. In the latter part of his reign he ordered a general survey of his kingdom, the results of which are contained in the famous "Domesday Book." He married Matilda, a daughter of Baldwin, Earl of Flanders. He died at Rouen, in 1087.

Rochet. — Louis Rochet was born at Paris, in 1813. He was a pupil of David d' Angers, and won medals in 1841 and 1855, respectively. He died in Paris, in 1880. His principal works were an equestrian statue of the Emperor Dom Pedro I, in Rio Janeiro; an equestrian monument to Charlemagne, erected in front of Nôtre Dame, in Paris; statues of Napoleon as a scholar, at Brienne, erected in that city; of General Daumesnil, at Vincennes; and of the Comte d' Erlon, at Rheims. His ideal sculptures include a group of "Ugolino and his sons"; "Minerva"; "Cassandra"; and "Mercury and Bacchus."

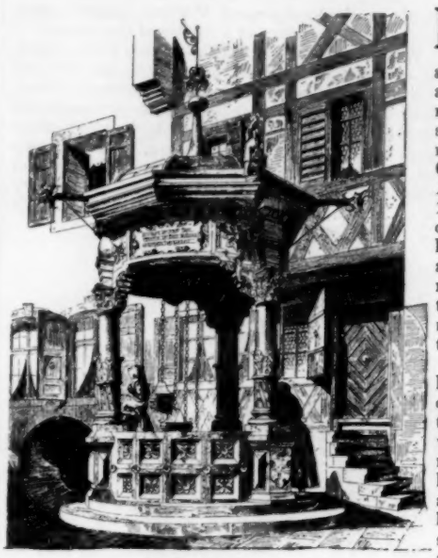
Hugh Lupus. — Hugh d' Avranches, called Lupus (also "Hugh the Gross," from his corpulency) was the son of Richard, Earl of Avranches, in Normandy, and either came to England with the Conqueror or shortly after followed him. Hugh was a nephew of William, who created him the first Earl of Chester and Lord of the Welsh Marches, in 1070. Lupus established his own parliament; created eight barons, whom he gave great possessions and many privileges; instituted three *asyla* or refuges for the fugitives of all nations, in order to recruit the population of the Palatinate; and bestowed large endowments upon the Abbey Church of St. Werburgh (now Chester Cathedral) within whose walls he died and was buried in 1101. He was one of the Conqueror's chief men, and was a brave and able soldier, an active and prudent ruler and an indefatigable huntsman. Although in the latter part of his life he became luxurious and prodigal, he was a generous patron of honorable men, clerks as well as knights.

Watts. — George Frederick Watts, R. A., was born in London, in 1818. As an artist, he is self-taught. His first picture was exhibited at the Royal Academy in 1837, and in 1843 he gained a prize of £300 for his cartoon of "Caractacus," and one of £500 from the Commissioners for the Decoration of the Houses of Parliament, for his "Alfred inciting the Saxons to prevent the landing of the Danes." His fresco of "St. George and the Dragon" is at Westminster Palace, and his large mural painting entitled "Justice: a Hemicycle of Law-givers," is in the new hall of Lincoln's Inn. Among his ideal paintings may be mentioned "Love and Life," and "Love and Death"; "Orpheus and Eurydice"; "Paolo and Francesca"; "Time, Death and Judgment"; "Hope"; and "The Court of Death." His portraits include Cardinal Manning, Tennyson, Millais, Sir Frederick Leighton, Gladstone, John Stuart Mill, Dean Stanley, the Duke of Argyle, Browning and Joachim. In 1884 he lent a representative collection of his paintings to the Metropolitan Museum of Art in New York, where they were on exhibition for a number of months. His works in sculpture are "Venus"; "Clytie," (a bust); monuments to the Marquis of Lothian at Blickling Hall, Norfolk; to Mr. Cholmondeley Owen, at Condover Hall, near Shrewsbury; and to the Bishop of Lichfield, in Lichfield Cathedral; and a colossal equestrian group, upon which he is now engaged, called "Vital Energy." Mr. Watts has received the titles of D. C. L. and LL. D. He declined a baronetcy in 1885.

[To be continued.]

What is a Fire? — A curious point of law, bearing upon the responsibility of insurance companies, has just been decided in the Paris Law Courts (5th Chamber of the Civil Tribunal of the Seine), at the suit of the Countess Fitz-James *vs.* the Union Fire Insurance Company, of Paris, by which it is ruled that insurance companies must indemnify all losses sustained by an assured caused by fire, even in the cases where no destruction of premises has been caused by conflagration. The Countess Fitz-James insured against fire, in the above company, all her furniture and effects for 558,000 francs, and in her policy, under Art. 7, were mentioned her jewels, among which figured specially a pair of earrings, composed of fine pearls, valued at 18,000 francs. On April 17, 1887, one of these earrings, which had been placed on the mantelpiece, was accidently knocked down by the countess and fell into the fire, where it was consumed, notwithstanding every effort made to save the jewel. Expert jewelers were called in by both parties to estimate the intrinsic value of the property destroyed, and 9,000 francs was stated to be the amount, less 60 francs for molten gold rescued from the ashes. The insurance company refused to pay for the burnt pearl on the ground that there was no conflagration, that the fire which consumed the object was an ordinary fire; in other words, that there was no fire, and that the company was not responsible where combustion had only occurred by the ordinary use of a grate for heating purposes. The court, however, rejected this, and ruled that "the word *fire*, in matters of assurance, applied to every accident, however unimportant such accident may be, so long as it is caused by the action of fire." It was, therefore, ordered that the Union Company should pay to the Countess Fitz-James the value of the jewel, less that of the gold recovered, viz., 8,940 francs and costs. — *Irish Law Times.*

JEAN PAUL AUBÉ.[1] — II.



In 1880, when the Government opened a competition for a great monument at Versailles, to commemorate the Constitutional Assembly of 1789, Aubé, in company with his old friend and school comrade, Dalou, and two architects, made a sketch ten feet high.

There were a large number of competitors, and, though no choice was made, the result of the labors of this art partnership brought to the sculptors three thousand dollars in money, and to each an important commission. Amongst the sculpture on the sketch was a bas-relief by Dalou, representing the famous scene in the Assembly between Mirabeau and the Duke de Dreux Brézé, in which Mirabeau declared, in a voice of thunder, "We are here by the will of the people, and we propose to stay unless driven away by the point of the bayonet." And also a sketch, by Aubé, of Bailly giving the oath in the Jeu de Paume, June 20, 1789.

When Gambetta visited the exhibition of the models he was so strikingly impressed with the style and audacity of the bas-relief, though it was of small size, and the earnest elegance and simplicity of the Bailly, that he said to those who were with him, "The sculptor should be commissioned at once to execute those sketches in large dimensions." M. Turquet, Rodin's good friend, was at that time Under-secretary of State, and he heartily joined in the wish expressed by Gambetta. With two such men as interested friends, the sculptors did not wait long before receiving commissions from the Government to execute their sketches. To Dalou, especially, this event was of the utmost importance. He had been a political exile in London since 1871, and had just returned to Paris without either work or money. He was really in deep misery, though he was well known in Paris as a sculptor of remarkable ability, and in London he had made many works of superior merit. The commission for the great bas-relief, for there are in it over fifty figures larger than life, set him on his feet, or, as Aubé says, "It hatched him."

To Aubé, the order for the "Bailly" was also important. It was a subject of historic and dramatic interest, one requiring for its full expression a high and peculiar style of genius, rare even in French art.

The bronze statue of Dante and a group, in plaster, of "War," were exposed in the *Salon* of 1880. The reappearance of the "Dante" in a material calculated to emphasize its character was the signal for a universal commendation by artists and critics, summed up in a single sentence: "The 'Dante' reveals an artist who is preoccupied with the beautiful in the grand." The full merits of the statue were not signalized until several years later, and after the sculptor had executed three or four more statues of historic character. The group of "War" was generally condemned because of the too savage interpretation of the subject. The sculptor represented the goddess as a terrible fury, who, sword in hand, was rushing over the earth like a cyclone, trampling under her feet the unprotected infant, and leaving death and desolation wherever she went. Though this interpretation was true and the composition excellent, it was too much even for the warlike descendants of the ravaging Gaul.

For the *Salon* of 1881, Aubé sent his "Agriculture," in marble, and a bust of Count Simeon, also in marble, and belonging to the Council of State. The year following he exposed a fine statue, in plaster, of Michel Lallier, an ancient Paris mayor, which is placed on the Hôtel de Ville. In 1883 his plaster figure of Bailly appeared, accompanied by an exquisite nude female statue, called "The Coral." Both were well appreciated, especially by the artists, but it was not until the following year, when the "Bailly" was exposed in bronze, that the writers became aware that it was a superior work of art, "one of the finest historical figures in France."

With it Aubé exposed a plaster statue of Shakespeare, larger than life, representing the bard as reciting his own plays. While the "Bailly" was cordially received as a beautiful figure, full of

[1] Continued from No. 712, page 77.

simple and grand dignity, very natural and living, "coming from a sculptor who manifests more and more a strong and refined originality," the "Shakespeare" was criticised as well as praised. Every Frenchman knows all about Bailly, and the statue was recognized as thoroughly representing the personage whose name it bore, and its author, as one of the few sculptors who are leaving far behind them classic or academical traditions, and approaching more intimately than ever to the free and living teachings of nature. "The statue is one of the very best historic works in France, the author belonging to the first order of sculptors."

The sculpturesque character of the "Shakespeare" raised no question. "It was well modelled, thoroughly understood as a construction, elegant in its style and movement; but was it a good representation of the personage?" said a few critics. Its most serious eulogists simply affirmed that its justice and vivacity of movement was not only remarkable, but that it revealed an intimacy of conception every way worthy of the subject.

It is surprising that these statues brought the sculptor no *Salon* medal. The "Bailly" went to its destination, the Chamber of Deputies, and the "Shakespeare" to the artist's studio, where it still remains. If Aubé failed to win the accustomed *Salon* recognitions, he was quietly and surely attaching to himself a more certain fame among powerful public art lovers and men of political influence. His few artist friends were sure of his future, and for himself he had no anxiety. His work shown at the *Salon* produced the desired result: he could live without medals.

THE COMPETITION FOR THE GAMBETTA MONUMENT.

Three months after the death of Gambetta, March 28, 1883, the friends of this statesman whom France had lost when she needed him the most, addressed to their fellow-citizens an appeal having for its object the erection of a monument to his memory, which closed as follows: "It is necessary to glorify, in a symbol that the genius of our artists will make as magnificent as the subject, the double enterprise to which Gambetta, as great a Republican as he was a Frenchman, has consecrated his life — national defence and the foundation of the Republic. To serve as a lesson and an example to generations to come, this monument should be erected on one of the public places of Paris." The entire country was called upon for subscriptions, and from every corner of it there was an immediate and hearty response, the subscribers numbering more than two hundred and fifty thousand. More than eighty thousand dollars were received before a year had elapsed, and a competition was immediately opened to all French artists. Eighty-four projects were presented by the first of June, 1884, for the consideration of the committee and the examination of the public. The committee was composed of prominent public men, legislators and artists, the latter being Chapu, Dubois, and Guillaume, sculptors, and Garnier, architect. The president was Antonin Proust, one of the most ardent and energetic of French art lovers. Each project bore the name of its author or authors, for most of them were made in colaboration between a sculptor and an architect. Aubé contributed two, one in conjunction with Dutert, the other with Boileau. In the large majority of press notices of this immense expression of concurrent art effort, the project of Aubé and Boileau was ranked among the best three, but before any decision in regard to the relative merits of the projects had been reached Aubé's had gained in general favor, because of the subjects he had included in his design and their relation to each other. The composition was declared to be of the first order. The projects were divided between two principal types: those that were surmounted by an allegorical figure of France or the Republic, in a sense protecting the statue of the orator, which was placed in high relief below, and on the face of the monument, and those that placed Gambetta on the summit of the structure. The principal objection to the last was the evident difficulty of giving sufficient dimension to this statue, so that it might appear as the dominating element of the composition, and still preserve a well-proportioned whole. The Aubé and Boileau project belonged to the first category.

The first duty of the committee was to select six of the eighty-four projects, and request their authors to make a second and final essay, these projects to be one-tenth the size of the full dimension. The following were chosen in the order of merit, as selected by the committee:

1. Falguière, sculptor; Pujol, architect.
2. Coutan, sculptor; Lambert, architect.
3. Aubé, sculptor; Boileau, architect.
4. Injalbert, sculptor; Laloux, architect.
5. Dalou, sculptor; Faure Dujarrier, architect.
6. Aubé, sculptor; Dutert, architect.

The final decision was made in November, 1884, after a deliberation by the committee of three hours, during which several votes had been taken. There were fifteen committee-men, and the Aubé-Boileau project was chosen by nine votes. Four votes were given to Falguière and two to Dalou. Twelve hundred dollars were awarded as a prize, to Dalou, by nine votes; eight hundred to Falguière, by fourteen votes, and six hundred each to the other three competitors.

The monument was described in the papers as follows: "A pedestal in the form of an obelisk resting upon a base. On each side of the base a large allegorical figure in bronze, one representing Truth with her looking-glass, the other, Force. In front, and attached to the pedestal, a very animated group slightly recalling that of Rude, on the Arch of Triumph. In the centre of this group stands Gambetta, while over and above him a genius unfurls a flag, and soldiers spring up around him as if animated by his voice, one of them picking up a sword which lies at the statesman's feet. On the summit of the monument is placed a winged lion, who carries upon his back the nude figure of a woman, representing the young Republic. In her hand she holds a tablet upon which is written the declaration of the rights of man. The lion seems to have made a great effort to get to the place he occupies, and to remain there firmly and safely. His action shows grand energy and style." The idea embodied in the monument, as described by the sculptor, is this: "We did not wish to make a statue or a monument to Gambetta, but a kind of commemoration of the work in which he was the most valiant assistant. Nor did we wish to have it recall the structures erected to the glory of princes and Cæsars. I don't know that I can clearly give my thought in words. We wished to make a monument to Democracy. For instance, as Napoleon surmounts the column of Vendome, so we desired that, in a Republic, Democracy should dominate and complete our shaft.

"In nearly all the models (some of which were very remarkable) it was the figure of Gambetta which dominated. The jury chose ours, without doubt, because they found our conception in closer *rapport* with the sentiment that was indulged in by those who gave their money for the erection of the monument."

Of the hundreds of newspaper notices of the designs for the monument, the large majority commended the choice of the jury. A few writers, while warmly acknowledging the merits of the chosen design, regretted that the competition did not bring out work worthy of such masters as Rude, Barye and Fremiet. It was not, they said, such a competition as was to be expected from French sculptors. "It represents a good condition of decadence." "The sculpture is more graceful than grand, more elegant than monumental." The longest and severest criticism appeared in the *Figaro*, from the pen of Albert Wolf. Here are some extracts: "Monumental sculpture is particularly different, because it has to contend with space; its principal function is to impress by its clearly-cut forms, composed of simple and powerful lines; the first view should produce this impression and print it permanently upon the mind. The great defect of all these sketches is, that they lack unity of conception. Not one of them can be seen clearly at first sight. All suffer from an accumulation of incidents in the life of Gambetta, or by allegorical representations of his virtues which trouble the observer and call his attention from top to bottom, from one side to the other.

"These six sketches of various apotheoses are all defective from a conceptive point-of-view; they are all evidences of the regretable tendency of modern sculpture which is nothing but literary sculpture. Our sculptors are not contented in making the statue of Gambetta, they wish to recount his whole life; behind him, at his feet, at the four corners, on top, they repeat anecdotes about him, until he is completely lost in a crowd of accessories. Monumental sculpture, destined for public places, ought to be, above all, simple; appealing to the mind by grandeur of line, and clearly presenting the principal statue alone in space. At no epoch have great sculptors proceeded otherwise; always, through all the centuries, their art has been based upon the same principle of simplicity. From this point-of-view there are no more works of art worthy of the name; and consequently the projects for this monument have not the qualities to satisfy those who know; they are all so complicated by invention that the eye goes here and there without finding complete satisfaction." "The trouble is that we don't know how to do things with moderation and tact; we pour out exaggeration from every side with equal vigor. We are overdoing the thing, our zeal runs away with us."

"Let us take an example from Italy, in the monument which she has erected to Cavour, at Milan. It is impossible to produce a greater effect with such simple means. Nothing shocks you; his whole life is contained in a figure of History, who, pen in hand, writes the name of this great statesman on her tablet. The artist who made this monument has not stuffed us with insignificant and useless details, like political wisdom, military force or other allegorical representations. Up to this time bas-reliefs discreetly placed on the pedestal have sufficed to give the details of the life of a man, but never have they invaded and covered up the principal figure. Go and look at these six sketches, and tell me if they are not more like the apotheoses of fairies mounting through the clouds rather than serious works of monumental art." "None of these projects are worthy of the subject, but the jury are right in choosing that by Aubé and Boileau, because it is the most interesting. The public will ratify the jury's judgment. There was no other way but for them to crown the sketch by Aubé." The other sketches were mercilessly ridiculed by the *Figaro* critic, especially emphasizing the fact that their authors were, with one exception, Grand Prix de Rome, and were now fairly beaten by a man who had never received the honors of the School, and had received but few of its benefits. The whole scheme of the monument was severely condemned by those who did not admire Gambetta, because of its size and pretension. It embraced too much; not only was the stateman's memory consecrated but the Revolution glorified, in the programme marked out by the friends of the chief figure in the National Defense. "Neither Charlemagne, Henry IV, Louis XIV, nor Napoleon, has any memorial to compare with this to Gambetta. What will the world think of

Thiers, with the simple statues erected to his memory, when it sees this ambitious structure?"

Another item of importance to the sculptor was that the sum collected to pay for the monument was barely sufficient for the purpose, and necessitated the greatest economy in the execution.

Many of the art-writers spoke of Aubé as a sculptor little known to the general public, though the author of several statues of exceptional merit. Some of the more serious ones publicly congratulated him upon his long-deserved good fortune, and embraced the opportunity to reproach the powers of art in France that a man of such fine talents should be obliged to wait and work until he was forty-five years of age before he was charged with an important public commission.

Allusion was also made to the injustice Aubé had suffered in other competitions, where his sketches had been the best, but were overruled by other than art considerations. Very pointed references were made to the shameful conduct of certain artists, and to the questionable manner in which competitions were too often conducted. "The decision of this competition is just — a rare event."

He was generally spoken of as "the author of *Dante*." A few writers attempted to say something about his life in the space of fifty words. One of them, representing *Le Matin*, ventured to visit his humble abode in a distant quarter of the city for the purpose of interviewing him. He received "the idea of the monument," as quoted, and added, "Aubé, unknown yesterday, to-day celebrated, modest, simple, frank, cordial; it needs an hour of conversation with him to know his good qualities." T. H. Bartlett.

(To be continued.)

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

A PARTY-WALL QUESTION.

York, Pa., September 2, 1889.

To the Editors of the American Architect:—

Dear Sirs, — I have just read in your last issue your opinion on my communication, "*A Party Wall Question.*" Now for the sequel. A approached me a few days ago and said that he would not forget that himself and B were neighbors and should dwell together in peace and harmony, therefore, we might use the party-wall without opposition or charge from him. Very truly, Equity.

NOTES AND CLIPPINGS

Casting Plate-Glass. — The casting-tables, the most important pieces of apparatus in a plate-glass works, are nineteen feet long, fourteen feet wide and seven inches thick. Each is provided with an iron roller, thirty inches in diameter and fifteen feet long. Strips of iron on each side of the table afford a bearing for the rollers, and determine the thickness of the plate of glass to be cast. The rough plate is commonly nine-sixteenths of an inch in thickness; after polishing it is reduced to six or seven sixteenths. The casting-tables are mounted on wheels, and run on a track that reaches every furnace and annealing-oven in the building. The table having been wheeled as near as possible to the melting-furnace, the pot of molten glass is lifted by means of a crane, and its contents quickly poured on the table. The heavy iron roller is then passed from end to end, spreading the glass into a layer of uniform thickness. The whole operation of casting scarcely occupies more time than it takes to describe it. Each movement is made with almost nervous rapidity. Few industries offer such fine scenic display as the pouring of molten glass. One feels like crying Encore! it is so very brilliant. In contact with the cold metal of the table the glass cools rapidly. As soon as possible the door of the annealing-oven is opened, and the plate of glass introduced. The floor of the oven is on the same level as the casting-table, so that the transfer can be conveniently and quickly made. When, after several days, the glass is taken out of the oven, its surface is found to be decidedly rough and uneven. A small quantity is used in this condition for skylights and other purposes where strength is required without transparency. It is known in the market as rough plate. The greater part of the glass, however, is ground, smoothed and polished before it leaves the establishment. — *British Mercantile Gazette.*

John Gregory Crace — Mr. Crace, who died recently, at his residence, Springfield, Dulwich, was for many years an active member of the Society of Arts. On January 27, 1858, he read a paper on "The Use of the Soulages Collection of Italian Art in Modern Art Manufacture," when numerous specimens from the collection were exhibited. Four years later he read a paper on "The Decoration of the International Exhibition Building," a work upon which he was then engaged. In 1866 he read a paper on "Old London: its streets and thoroughfares," the information in which was grounded on the fine collection of London views originally formed by Mr. Crace's father, and now in the British Museum. Mr. Crace was born in 1809, the fourth in descent of a race of artistic decorators. His father, Frederick Crace, was the son of John Crace, who was born in 1754. John Crace's father (Edward) decorated the Pantheon in Oxford Street, in 1771, and in 1780 was appointed by the Crown Curator of the pictures in the Royal Palaces. Mr. J. G. Crace was selected by Government, in 1848, to execute the colored decoration of the new Houses of Parliament. He was largely employed at the Exhibition of 1851, and designed the decorations for the Art Treasures Exhibition at Manchester, in 1857. In 1861, he was employed in the decoration of the Waterloo Chamber at Windsor Castle. In the following year he was engaged on the Exhibition of 1862, already referred to. He decorated the Society's meeting-room, when it was last repaired, in 1882, as he had done on previous occasions. — *Journal of the Society of Arts.*

TRADE SURVEYS

There is less room now for fault-finding with trade and business than, perhaps, for the past five years. The present outlook is most satisfactory, because of the multitude of new opportunities that are being offered to capital and enterprise. Southern industrial statistics show that, during the first half of the year, some 2,500 enterprises were started, as against 2,000 for the same time last year. These statistics show, also, that the investments of capital are larger. The South, as a field for enterprise, is gaining in favor among moneyed men. Land is appreciating in value slowly; nothing like a speculative movement is apparent. Railroad building is being pushed in all of the Gulf States and in the States west of the Mississippi. Huntington and his associates are credited with brilliant railroad construction schemes. If all of the rumors concerning projected railroad construction, ship-building, and like enterprises now heard on the street are to be credited, the South is on the eve of such a boom as it has never dreamed of. The favorable crop reports in the Southwest, including Texas, have stimulated agricultural, mining and manufacturing enterprise in those States. This healthy condition of affairs is assisting the activity of business in the Gulf States. Two or three new lines of railroad are projected there. Of course they will be mainly made up of the completion of existing lines, but some of the enterprises talked of involve the building of from two to three thousand miles of new line, mainly west of the Mississippi. If this is carried out, it will be followed by large land-purchasing operations by one or more syndicates of foreign capitalists, who are now in the South with a view to placing money where, in a few years, it will yield good returns. These capitalists and the railroad-builders who are going before them see in Mexico still grander possibilities for profitable investments. The mines of that country are yielding richer returns than ever, and new railroad construction will probably develop territory more valuable than any which has yet been worked. Of course, many of the schemes of this nature are merely paper schemes; but the capitalists on both sides of the Atlantic are aroused, and the crusade — for it is nothing more nor less — has started in to secure the cheap and almost valueless lands of these remote regions, with a view of holding them for future developments. There is an abundance of idle money in this country and in Europe, and in foreign countries there is a well-grounded feeling of distrust in the continuation of the rule of the now ruling powers. Wars may arise, which will not only jeopardize the control of existing governments, but also jeopardize the indebtedness which weighs down the masses in European countries. These may seem far-drawn inferences and conclusions, but the fact remains, nevertheless, that such considerations as these are moving capitalists who control scores of millions to transfer some of their money and management to the New World. These things are talked about much more abroad than they are here. Here we are busy with the details of making money, extending manufactures and trade.

So far as fall business has developed, there is no fault to be found with it. Jobbers are busy. Manufacturers also, in a general way, are busy. Iron and steel makers have more work on hand than they have had at any one time for years. The makers of structural and plate-iron are oversold from two to four months. There has not been such a rush of orders for years; but the effect so far has been only to strengthen prices, the producing-capacity being so enormous. The merchant-bar mills and merchant-steel mills are crowded with orders, and a general advance will probably take place if pig-iron should move up, as is probable. One large Southern company, and also one large Northern one, have already taken this step. There is some hesitancy among manufacturers generally as to advancing prices; it frequently checks business and retards enterprise. Outside of iron and steel there is similar activity. The coal-producers of the anthracite regions are a little behind the output of last year, and the management are unable to advance prices. So many new sources of supply have been opened during the past year that it is difficult to say whether this year's production of soft coal is larger than last; but the presumption is, that it is somewhat greater. During the past summer three or four hundred new lumber-yards, two or three hundred new foundries and a multitude of smaller concerns, involving the use of capital from $5,000 to $20,000, have been established in the States west of the Mississippi, and those who sell pig-iron, lumber, petroleum, machinery, motive-power, tools and implements, know to what an extent these little industries are contributing to the general prosperity that exists. Fortunately, there is an abundance of money, through the friendly action of the Government. The only real danger at this time is that the encouraging conditions may induce thousands of men to embark in trade and manufacturing, who should remain where they are. The business world now has its eye upon the railroad situation, and should that prove satisfactory, there will be a rush in railroad construction next year. But even should railroad-building not be prosecuted on a large scale, this much is assured: the demand for equipments is sure to be phenomenally heavy. Very few roads have maintained their equipment and motive-power in first-class condition, and nearly all the large companies ought to be in the market for supplies.

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